manufactured by it. The microbe itself may disappear early in the case; but the poison formed by it pervades the whole body, and especially the nervous system, and produces profound and lasting effects. An early disappearance of the microbe in influenza would explain the failure to find it on *post-mortem* examination; death from influenza being usually the result of complications rather than of the primary disease. Influenza is infectious at an early stage of the disease; but it is not known how long the infectious condition may last: some cases point to its being infectious as late as the eighth day, and we must suppose that, as long as the disease is communicable, the microbe retains its vitality.

Evidently there is a power of resistance in the human body to the invasion of the microbe, varying in different persons, for not all who are exposed to the infection contract the disease; the resistance to it being weakened by depressing influences—as fatigue, and exposure to changes of temperature.

The resistance to the poison seems also to be overcome when the dose is large: a certain degree of concentration seems to be necessary in order for the disease to take on an epidemic form.

The pabulum for the microbe, or the number of susceptible persons, seems also to be soon exhausted; for the decline of an epidemic as regards the number of new cases is often almost as rapid as its increase. At the same time the immunity conferred by an attack of influenza is of short duration, for a person may suffer repeatedly from the disease; and the same holds as regards communities, for many localities have suffered repeated epidemics of influenza during the last few years; whereas an epidemic of one of the ordinary infectious diseases is usually succeeded by a long period of comparative freedom. These are some of the points which have to be taken account of in any theory of the causation of influenza.

During the past week the announcement has been made in the public press of the discovery by Dr. Pfeiffer, in the Royal Institute for Infectious Diseases at Berlin, of a bacillus which he looks upon as the cause of influenza.

It will be remembered that a similar announcement, made, in January 1890, by Dr. Jölles, of Vienna, was not confirmed. Since then various observers have discovered in the sputa and lungs of influenza patients, micro-organisms of one kind or another; but their statements are conflicting, and the forms met with are some of them at least known to occur in other diseases; so that the inference is that they were either accidentally present, or connected with secondary affections for which the attack of influenza had prepared the way. Whether Dr. Pfeiffer's discovery will be more successful in gaining acceptance remains to be seen; but the position of its author, and the alleged confirmation of his results by Dr. Koch, will no doubt secure for it a respectful consideration.

As Dr. Koch has pointed out, in order that the relation of a particular micro-organism to a particular disease, as cause and effect, may be considered satisfactorily proved, the following conditions must be complied with:—

(1) The micro-organism in question must be present in the secretions, blood, or diseased tissues of the subject of the disease.

(2) The micro-organisms in question must be isolated and cultivated—all other organisms being excluded—in suitable media outside the animal body, through several generations of cultures.

(3) The micro-organisms, thus cultivated, when introduced into the body of a healthy animal of a susceptible kind must be capable of producing in it the disease in question.

(4) In the animal in which the disease has thus been produced the same micro-organism must again be found.

It is stated that, for the investigation of the etiology of influenza, a *clinique* for influenza patients was opened in September last in the Royal Institute for Infectious Diseases, and that the result of the exhaustive examination of the cases was the discovery in the matter discharged from the patients' lungs of a bacillus found in no other cases of disease of the respiratory organs, and which, as the patient recovered, gradually disappeared. It is stated that the bacilli were cultivated to the fifth generation, and that, inoculated into monkeys and rabbits, they produced in every case the symptoms of influenza.

It is added that these results were confirmed by Dr. Koch, who further discovered the same bacillus in the blood of patients in the febrile stage of influenza.

An account of the discovery is promised in the *Deutsche medicinische Wochenschrift*, and will be awaited with interest.

H. F. P.

ON THE MATTER THROWN UP DURING THE SUBMARINE ERUPTION NORTH-WEST OF PANTELLERIA, OCTOBER 1891.

WE did not reach Pantelleria till November 5, ten days after the end of the eruption, but a certain number of specimens had been secured at the time by people who went out in boats. Dr. Errera, who helped us in other ways, kindly gave me some pieces of a bomb from his own collection; and others, among them a good-sized bomb, some 30 inches in its longest diameter, were obtained from the inhabitants. Out of a number of small pieces from different people, I did not see any that might not have formed some part of a mass such as this last, and I have no evidence that any other kind of material was erupted.

General, Structural, and Mineralogical Characters.

Riccò (*Comptes rendus*, November 25, 1891) says that some of the bombs had a diameter of 2 metres, and that the prevailing shape was an "ellipsoid of revolution." They were not only porous in texture, but contained large cavities, and floated for a time, but pieces taken separately are fairly heavy. Riccò mentions a specific gravity of 1·4 (perhaps for a bomb when unbroken). A 4-ounce piece of the coarser material from the inside displaced less than half its weight of water, giving me specific gravity 2·3.

What most struck the possessors of specimens was their coaly blackness. Nevertheless, there was on the outside of the bombs a distinctly brownish layer, an inch perhaps in thickness, which the eye, or better, the pocket lens, shows to be due to vesiculation of the transparent brown glass that here forms the ground mass In certain places vesiculation has been carried so far tha we have a *coarse*[1] type of the "thread lace scoria," de scribed among others by Dana, from Hawaii (*Amer Journ. Sci.*, March 1888, p. 213, or his book, "Character istics of Volcanoes," p. 163, 1890).

In the brown glass of this part sections show numerous narrow crystals of triclinic felspar, and in places olivine and magnetite, and probably a little augite.

Beneath this brownish layer may occur another, say half an inch thick, coarser and darker than the former; but which in sections can still be seen to be for the most part brown transparent glass, with the above-mentioned minerals in it.

We are thus led to a layer perhaps an inch or two thick,[2] coarsely spongy, black, of pitchstone lustre, which

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[1] I find a prettier example of this structure on one side of a piece of scori picked up last month near the base of the active cone of Vesuvius. It wa partly covered by the brown dust ejected since the tapping of the lava on the side of the Atrio del Cavallo last summer. I do not know, therefore when it was erupted. I find on this, as on scoria that I saw erupted October 1889, a tendency to form Pele's hair (on a very small scale).

[2] Unfortunately, the only whole bomb that I saw went to pieces on the way to England. The point worth noticing is the difference in structure o different parts; and I give these rough measurements, taken from piece in my possession, merely to show the kind of dimensions with which we dealing.

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bounds the internal cavities of the bomb. Sections show that this inner material is largely crystalline. Perhaps one-third of its substance is composed of well-marked crystals of triclinic felspar, olivine, and augite, the rest being a black ground material, opaque in sections of ordinary thickness, except where relieved by micro-crystals of felspar.

Foerstner's Description of Specimens from Graham's Isle (Ferdinandea).

With the above it is interesting to compare Foerstner's account of the specimens from Graham's Isle which he examined (*Min. and Petr. Mitth.*, v., new series, 1883, pp. 388–96). I suppose specimens are scarce. He obtained three. That from Strasbourg consisted of light-gray lapilli, apparently altered by acid vapours. It differed much macroscopically from the other two. These lapilli contained magnetite and plagioclase.

The other two were as follows (I give an abstract of Foerstner's description):—

(1) Specimen in Museum at Naples was pumiceous and almost foamy, and had a brown ground mass with glassy lustre, in which crystals of plagioclase, olivine, and magnetite.

(2) Specimen from Palermo (collected by G. Gemmellaro) was black and vesicular, but in sections was very similar to (1). It appeared to be largely crystalline. Plagioclase most conspicuous, but also augite, olivine, and magnetite.

I have not seen the specimens, but the descriptions accord well with those given above for the outer and inner material of the recent bombs. As will be seen below, they also agree well enough chemically.

Description of certain Basic Scoriæ from the Island of Pantelleria.

I did not obtain specimens of the plagioclase-basalts from the Cuddie Monti and S. Marco, analyzed by Foerstner (see below), but I have basic scoriæ from different localities in the north-west part of the island. Specimens from Cuddie Brucciate, while differing in structure, agree mineralogically with the recent ejecta, having crystals of triclinic felspar, olivine, and augite, set in a glassy or opaque black ground, as the case may be.

Further, some very black and rough specimens, from a small patch of basic scoriæ north-east of the Bagno del Aqua, not only agree mineralogically, but are in texture not unlike the intermediate portion of the bomb described above.

A Comparison, as to Chemical Constitution, of the Products of the Recent Eruption with those of Graham's Island, and certain Lavas of Pantelleria, Etna, and Vesuvius.

In the following table the iron oxides are taken together. In the case of the Etna lava of 1865, the analyses by Fuchs and Silvestri disagree as to the proportions of FeO and Fe_2O_3.

The results in the first four columns are from a table in Foerstner's paper (*loc. cit.*). For the fifth column I have to thank Mr. Geo. H. Perry, who has made an analysis of part of the large mass above mentioned, and also Prof. Thorpe, F.R.S., who kindly permitted the work to be done in the laboratory of the Royal College of Science. Mr. Perry's analysis will be found in full below.

This table speaks for itself. There is in the recent bomb a little less silica and a little more alumina than in the specimens from Graham's Isle, Etna, and Pantelleria, while the percentages agree with those in the specimen from Vesuvius.

	Plagioclase-basalt, S. Marco, Pantelleria (Foerstner).	Plagioclase-basalt, Cuddie Monti, Pantelleria (Foerstner).	Plagioclase-basalt, Etna, 1865 (Or. Silvestri).	Plagioclase-basalt, Graham's Isle, 1831 (Foerstner).	Bomb from submarine eruption N.W. of Pantelleria, October 1891 (Geo. H. Perry).	Leucite-basalt, Vesuvius, 1867–68 (Fuchs).
SiO_2	49·87	49·35	49·95	49·24	46·40	46·94
Al_2O_3	14·80	15·71	18·75	19·06	21·84	21·35
Iron oxides	15·13	14·40	11·30	12·10	11·57	12·23
MnO	—	—	0·49	—	trace	trace
CaO	9·36	9·80	11·10	8·75	10·33	9·69
MgO	6·77	5·71	4·05	5·00	5·37	3·78
K_2O	0·68	1·31	0·70	1·19	1·69	5·57
Na_2O	2·81	2·96	3·71	3·89	3·27	1·62
Water	0·45	0·49	0·70	0·63	—	—
	99·87	99·73	100·75	99·86	100·47	101·18

We may note that Foerstner[1] describes a decrease in the amount of silica in the rocks erupted on Pantelleria itself during the later part of its history. Thus, the oldest rocks of the island are described by him as phonolites, liparites, and andesites, probably of Tertiary age, containing from 60–73 per cent. of SiO_2. Then, coming to the group of rocks which, as containing the mineral "cossyrite" (rather, *ænigmatite*) and much soda and iron, he distinguishes by the name of "Pantellerites" (which rocks form the greater part of the surface of the island), he finds that the older ones contain about 70 per cent. of silica, and the younger only 67 per cent., thus heralding the outburst of basic rocks (lavas and scoria) containing some 49–50 per cent. of silica (see table above), which form the most recent rocks of the island, and are confined to the north-west part of it.

That we should find a still further decrease of SiO_2 to 46·40 per cent. is, so far, interesting. I have not come across an analysis of any very recent lava of Etna to know whether the lava of that district shows any tendency in the same direction.

In conclusion, I must express my thanks to Prof. Judd, to whom I am indebted for reference to the authors quoted, and for loan of papers.

December 26, 1891. GERARD W. BUTLER.

ANALYSIS OF VOLCANIC BOMB, PANTELLERIA, OCTOBER 1891.

Percentage Composition of Washed Powder, dried at 120° C.

	1.	2.	Mean.
SiO_2	46·39	46·42	46·40
FeO	2·20	1·88	2·04
Fe_2O_3	9·53	9·53	9·53
Al_2O_3	21·77	21·91	21·84
MnO	mere trace	—	mere trace
CaO	10·31	10·36	10·33
MgO	5·35	5·39	5·37
K_2O	1·65	1·73	1·69
Na_2O	3·42	3·13	3·27
Loss on ignition	—	—	—
	100·62	100·35	100·47

As the powder was magnetic, Fe_2O_3 was probably combined with FeO to form Fe_3O_4. This would give—

FeO 7·55
Fe_3O_4 4·18.

December 22, 1891. GEO. H. PERRY.

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[1] "Nota preliminare sulla Geologia dell' Isola di Pantelleria" (with geological map), *Boll. Com. Geol. d'Ital.*, 1881.

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